

V.3.3-PEAKFLOW PEAK FLOW COMPARISON OPERATION

Identifier: PEAKFLOW

Application: Calibration System programs only

Description: This Operation produces displays of observed versus simulated instantaneous peak discharge for the major annual runoff events.

The annual peak stage occurring on a different date than the peak discharge can also be displayed if such a situation occurs due to back water effects or ice and debris blockage. The observed peak flow data is obtained from the USGS historical surface water data base accessible from their web sites (only the day, and not the hour and minute, associated with observed peaks is retained by the USGS). The simulated peak flow is the largest instantaneous simulated flow found in a user defined window of time surrounding the observed peak. See Chapter III.2-PEAKFLOW for a description of how to obtain peak flow data.

The PEAKFLOW Operation produces a table and summary statistics of the observed and the corresponding simulated instantaneous peak discharges. Peak discharge and timing errors are highlighted to provide additional calibration feedback that is not available from mean daily discharge data. Peak stage data will be displayed if the peak stage of the river is different from the date of peak discharge. This type of event is caused from winter ice jams or backwater effects from debris blocking the river at some point down stream. The display is presented after the end of the calibration run.

Allowable Data Time Intervals: 1, 2, 3, 4, 6, 8, 12 or 24 hours

Time Series Used: Time series used in this Operation are as follows:

<u>General Type</u>	<u>Dimn</u>	<u>Units</u>	<u>Use</u>	<u>Required</u>	<u>Data Time Interval</u>	<u>Missing Values Allowed</u>
Simulated-instantaneous discharge	L3/T	CMS	I	yes	all	no

Input Summary: The card input for this Operation is as follows:

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
1	5A4	1-20	General user supplied heading information

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
	2X,2A4	23-30	USGS station ID number where observed instantaneous stage and discharge data are recorded
	2X,2A4	33-40	Internal identifier for simulated instantaneous discharge time series
	1X,A4	42-45	Data type code for simulated discharge time series
2	3X,I2	4-5	Data time interval of simulated time series
	4X,I1	10	Window size (days) on each side of observed peak for determining corresponding simulated peak - maximum value allowed is 3 - minimum is 1
	4X,I1	15	Display option for observed versus simulated peaks: 0 = table only 1 = table and graph (graph option is not currently available)
	4X,I1	20	Peak table display option: 0 = chronologically 1 = display by magnitude
	4X,8A4	25-56	Instantaneous peak discharge input file name (see III.2-PEAKFLOW)

Sample Input and Output: Sample input is shown in Figure 1. Sample output from the execution routine is shown in Figure 2.

Error and Warning Messages: The error and warning messages generated by this Operation and the corrective action to take when they occur are as follows:

A. Messages that occur during setup:

1. **WARNING** INSUFFICIENT WORK SPACE TO STORE REQUESTED OBSERVED INSTANTANEOUS PEAK FLOW DATA.
2. **WARNING** ERROR OPENING PEAKFLOW DATA FILE =.
3. **WARNING** ERROR CLOSING PEAKFLOW DATA FILE =.
4. **NOTE** DUE TO WARNINGS ASSOCIATED WITH READING THE PEAKFLOW DATA, OPERATION PEAKFLOW IS IGNORED.
5. **WARNING** WINDOW SIZE FOR PEAK SEARCH IS OUT OF RANGE. USER SPECIFIED VALUE MUST BE BETWEEN 1 AND 3 DAYS. A

DEFAULT VALUE OF 3 WILL BE ASSUMED.

Action: Check value in column 10 of input card 2.

6. ****WARNING**** USER OPTION FLAG TO DISPLAY PEAK FLOW DATA CHRONOLOGICALLY OR BY MAGNITUDE OF FLOW IS NOT SET TO ZERO OR ONE RESPECTIVELY. DEFAULT VALUE IS SET TO ZERO, DISPLAYING BY MAGNITUDE OF FLOW.

Action: Check column 20 of input card 2.

7. ****WARNING**** OUTPUT DISPLAY OPTION SWITCH IS OUT OF RANGE. A DEFAULT VALUE OF 0 IS ASSUMED. ONLY THE TABLE OPTION IS CURRENTLY AVAILABLE.

Action: Check column 15 on input card 2.

Carryover Transfer Rules: The carryover for the PEAKFLOW Operation is not changed during the carryover transfer process.

Figure 1. Sample Card Input for Operation PEAKFLOW

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              - Column -
          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
PEAKFLOW      WTO2
Illinois at Watts      07195500 WTO2      SQIN
      6      3      1      0      wtto2.peak1234
    
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Figure 2. Sample Output From Operation PEAKFLOW Execution Routine

PEAKFLOW DISCHARGE AND TIMING ERROR SUMMARY

OBSERVED PEAK			FLAG	SIMULATED PEAK		TIMING ERROR(DAYS)	DISCHARGE ERROR(CMS)	DISCHARGE RATIO (SIM/OBS)	
Q(CMS)	H (M)	DATE		Q	H				Q(CMS)
225.0	3.8	7/ 1/1981	5		492.0	6/30/1981	1	267.0	2.19
1000.0	7.0	6/16/1982	5		874.0	6/16/1982	0	-126.0	.87
530.0	5.7	12/ 3/1982	5		11.5	11/30/1982	3 *	-519.0	.02
275.0	4.2	3/19/1984	5		259.0	3/19/1984	0	-16.0	.94
185.0	3.5	12/14/1984	5		321.0	12/14/1984	0	136.0	1.74
634.0	6.3	12/21/1984	5		1400.0	12/21/1984	0	766.0	2.21
544.0	5.8	1/ 1/1985	5		389.0	12/31/1984	1	-155.0	.71
668.0	6.4	2/23/1985	5		696.0	2/23/1985	0	28.0	1.04
575.0	5.9	3/30/1985	5		855.0	3/30/1985	0	280.0	1.49
220.0	3.8	6/ 5/1985	5		603.0	6/ 5/1985	0	383.0	2.74
739.0	6.7	11/19/1985	5		1040.0	11/19/1985	0	301.0	1.41
255.0	4.0	4/ 4/1986	5		238.0	4/ 5/1986	-1	-17.0	.93
654.0	6.5	4/ 8/1986	5		612.0	4/ 8/1986	0	-42.0	.94
192.0	3.5	9/17/1986	5		271.0	9/16/1986	1	79.0	1.41
197.0	3.6	9/29/1986	5		1130.0	9/30/1986	-1	933.0	5.74
1200.0	7.5	10/ 1/1986	5		1130.0	9/30/1986	1	-70.0	.94
399.0	4.9	3/18/1987	5		523.0	3/18/1987	0	124.0	1.31
255.0	4.0	4/ 4/1987	5		129.0	4/ 3/1987	1	-126.0	.51
377.0	4.8	4/14/1987	5		376.0	4/14/1987	0	-1.0	1.00
493.0	5.6	12/20/1987	5		641.0	12/20/1987	0	148.0	1.30
765.0	6.7	12/26/1987	5		754.0	12/25/1987	1	-11.0	.99
252.0	3.9	3/ 3/1988	5		14.9	2/29/1988	3 *	-237.0	.06
464.0	5.5	3/29/1988	5		739.0	3/29/1988	0	275.0	1.59
MEAN: 482.5 5.2					586.9		.4	104.4	1.39
(OBSERVED DISCHARGE EVENTS ONLY)									
*** INDICATES SIMULATED PEAK ON SEARCH WINDOW BOUNDARY, WHICH PROBABLY IS NOT THE TRUE PEAK.									
DISCHARGE RMS ERROR = 321.100 (CMS)									
TIMING RMS ERROR = 1.100 (DAYS)									
AVERAGE PERCENT ERROR (AVEOBSQ-AVESIMQ)/AVEOBSQ = 21.6 %									
CORRELATION COEFFICIENT (DISCHARGE) : R = .573									
BEST FIT LINE: OBSQ = A + B * SIMQ : A = 235.700 (CMS) B = .421									
LEGEND OF U.S.G.S. DATA FLAGS FOR PEAK DISCHARGE AND STAGE									
Peak Discharge, Q, Qualification Flags									
1 - discharge is a maximum daily average									
2 - discharge is an estimate									
3 - discharge affected by dam failure									
4 - discharge less than indicated value									
which is minimum recordable discharge at this site									
5 - discharge affected to unknown degree by regulation or diversion									
6 - discharge affected by regulation or diversion									
7 - discharge is an historic peak									
8 - discharge actually greater than indicated value									
9 - discharge due to snowmelt, hurricane, ice-jam or debris dam breakup									
A - year of occurrence is unknown or not exact									
B - month or day of occurrence is unknown or not exact									
C - all or part of the record affected by urbanization, mining, agricultural changes, channelization, or others									
D - base discharge changed during this year									
E - only annual maximum peak available for this year									
Gage Height, H, Qualification Flags									
1 - gage height affected by backwater									

- 2 - gage height not the maximum for the year
- 3 - gage height at different site and/or datum
- 4 - gage height below minimum recordable elevation
- 5 - gage height is an estimate
- 6 - gage datum changed during this year